

LES PÉRIODIQUES COMME MÉDIATEURS CULTURELS AUTOUR DE LA DIFFUSION DES SAVOIRS



DIRECTION

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SÉMINAIRE PÉLIAS

(Périodiques, Littérature, Arts, Sciences)
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Periodicals, Scientific Popularization, and Domaining Effects

Mark S. MORRISON

RÉSUMÉ

Périodiques, vulgarisation scientifique et effets de domaine

Cet article défend l'utilité du concept de « domaining » de l'anthropologue Marilyn Strathern, tel qu'il a été adapté à l'étude des sciences et de la littérature par Susan Merrill Squier, pour notre compréhension de la circulation et du développement des connaissances scientifiques à travers la culture populaire et la vulgarisation scientifique. À l'aide d'exemples tirés des travaux de Squier sur les technologies de reproduction et de mes propres travaux sur les premières décennies de la recherche sur la radioactivité et la physique nucléaire, l'article montre que les périodiques constituent un environnement propice à la création de liens et de déplacements qui se produisent dans le cadre de la recherche scientifique. Ils combinent en effet plusieurs auteurs, différents genres et des images visuelles, souvent fournies par plusieurs illustrateurs ou dans le contexte de textes et d'images publicitaires. Le concept de « domaining » de Strathern met en évidence les dimensions culturelles de la construction et de la circulation des connaissances et nous aide à interpréter les juxtapositions d'images et de tropes dans de multiples domaines. La vulgarisation scientifique peut donc être comprise comme faisant partie d'une pratique de négociation culturelle en constante expansion.

MOTS-CLÉS : Marilyn Strathern, Susan Merrill Squier, sciences & littératures, radioactivité, physique nucléaire, vulgarisation scientifique, *Journal of the Alchemical Society*

The historiography of scientific popularization has undergone significant change over the past few decades, with James Secord calling for a more capacious investigation of science as itself a “form of communication”,

and Jonathan Topham, with whom I had the privilege to present at the 2019 PéLiAS (Periodicals Literature Arts Sciences) seminar, Periodicals as Cultural Mediators (Literature, Art, Sciences), arguing for a constructive role for the rigorous study of scientific popularization—comprising both science in popular culture and popular science writing—in a historiography of science attentive to issues of epistemology, knowledge production, and the circulation of knowledge. Indeed, this emphasis on “knowledge in transit”, to use Secord’s phrase, underscores the focus of the 2019 PéLiAS seminar on “periodicals as cultural mediators”. Secord has argued that the “central question” for those in the field of history of science is “How and why does knowledge circulate?” (Secord, 2004: 655). Such an understanding naturally raises questions about the nature of what is being communicated, what is circulating, and how the circulation itself might be understood to generate and shape knowledge—or, to retain the seminar’s focus on periodicals as cultural mediators, why periodicals remain such an important locus for research on the circulation and production of scientific knowledge.

These issues of knowledge construction and circulation are also front and center for scholars in literature and science. While drawing on Secord’s and Topham’s historiographic approaches, I will advocate for bringing to our research on periodicals an additional concept, ‘domaining’, adapted for the field by Susan Merrill Squier from anthropologist Marilyn Strathern. Examples from Squier’s research on reproductive technologies and from my own on early twentieth-century atomic theory will demonstrate how the concept of domaining helps us understand the shifting meanings and implications of tropes and metaphors in circulation during the height of periodical culture in the UK and US. The concept highlights the cultural dimensions of knowledge construction and circulation, and it also helps us interpret the juxtapositions of images and tropes in multiple domains found not only across periodicals but within individual ones. Scientific popularization can thus be understood in terms other than the individual agency and efforts of specific writers and scientists, and it can be seen as part of an always expanding practice of cultural negotiation.

Periodicals and the historiography of popular science

While ‘popular science’ was a dominant feature of print culture during the late nineteenth century and the first half of the twentieth, its two major components—science in popular culture and scientific popularization—coincided with the professionalization of the sciences beginning to take its contemporary form in the US and UK and with a rapidly expanding periodical culture. This culture was built upon revenue from national advertising campaigns and by innovations in genre, house style, and enhanced visual technologies. Periodicals brought ideas and images from science into popular culture in a number of ways, including through the rise of science fiction in magazines in the 1920s and 1930s such as Hugo Gernsback’s pulps *Amazing Stories*, *Science Wonder Stories*, and *Air Wonder Stories*; the increasing engagement with scientific ideas in occult or spiritual periodicals such as *The Occult Review* or the publications of the Theosophical Society; and the rise of self-consciously popularizing journals such as *Knowledge*, *Illustrated Science*, or *Popular Science Siftings*. But periodicals also encouraged new scientific breakthroughs to be translated into the language of advertising. Take, for example, the widespread invocation of radium, a newly discovered element, in cosmetic product ads. Frequently appearing in mass-circulation periodicals were ads by cosmetic companies such as Radior, which promoted ‘radium’ products and pamphlets on “Radium and Beauty”, not to mention the countless hucksters offering health products such as ‘radium water’ or ‘radioactive toothpaste’ (that, thankfully, likely had little or no radium in them).¹

Moreover, mass reading audiences were hungry for more than consumer products invoking the latest science. They wanted to read about the latest scientific developments as well. Popular science writing in magazines—authored by scientists themselves or by journalists following scientific developments closely—was in vogue on both sides of the Atlantic and reached

¹ For an example of a Radior ad, see the *New York Tribune*, November 10, 1918, 12. In that year, only 13.6 grams of radium were produced in the US, and radium was so expensive that many ‘radium’ products either contained no radioactive substance at all or tiny amounts of far cheaper uranium oxide ore. For a catalog of such products, see: Buchholz & Cervera, 2008.

increasingly wider audiences before television or even radio began to compete significantly with periodicals. Marcel C. LaFollette explains that:

Descriptions of science were especially vivid in the popular periodicals of early twentieth-century America. Curled up by the fire-side, teenagers could learn about the latest exploits of physicists and chemists; their parents could read how research could help win a war or cure disease. Until the rise of television in the late 1950s, mass magazines such as *The Saturday Evening Post* and *Cosmopolitan* were information sources about the world of science that were easily accessible to millions of readers in all parts of the country and from all walks of life. (LaFollette, 1990: 3)

Indeed, this proliferation of popular science writing in the US during the 1920s was driven by the scientific community's efforts to establish a national science program after World War I (Tobey, 1971: chapters 1-3).

The situation was similar in the UK. As Gowan Dawson, Richard Noakes, and Jonathan Topham have explained, in nineteenth-century Britain, "from the perspective of readers, science was omnipresent, and general periodicals probably played a greater role than books in shaping the public understanding of new scientific discoveries, theories, and practices" (Dawson, Noakes & Topham, 2004: 1-2). While professionalization and specialization in the sciences and scientific journals during the period may have made some scientists reluctant to continue to engage general audiences, Peter Bowler has challenged the "myth of the isolated professional", arguing that "in the decades after 1900 a significant proportion of Britain's scientists tried their hand at nonspecialist writing, and some of them made a regular habit of it" (Bowler, 2009: 3). Albert Einstein, Julian Huxley, J. B. S. Haldane, Frederick Soddy, James Jeans, Arthur Eddington, and Sir Oliver Lodge were among many noted scientists who published popular accounts that reached wide audiences. Michael Whitworth has shown that not just popular science periodicals but also key literary periodicals, such as *The Athenaeum* and *The Criterion*, featured significant popular science writing and "demonstrate that science was deeply embedded in literary culture" (Whitworth, 2001: 45).

But how to study scientific popularization, and why, has been a thorny issue. For scholars in literature and science, a narrow focus on popular science writing can be seen to imply two assumptions that the field has

challenged for decades: that scientific knowledge is a stable given, one to be conveyed or represented to receptive lay readers, and that the professional generation of scientific knowledge remains largely separate from other knowledge domains. The history of science has been quicker to embrace scientific popularization as a research area. But over the past two decades, the concerns of both fields—literature and science, and the history of science—with issues of epistemology and the circulation of knowledge have brought them into much closer alignment and led them to productively focus on periodicals as primary research objects.

Topham, in his introduction to a special issue of *Isis*, highlighted the utility of continuing to study ‘popular science’ as a historical phenomenon and the complex ways in which it might be articulated through broader conceptualizations of epistemology, knowledge production, and the circulation of knowledge. As Topham puts it, “Historical studies of ‘popular science’—viewed variously as science popularization and as science (or natural knowledge) in popular culture—have not only proliferated in recent decades; they have also become increasingly sophisticated in their historiographies” (Topham, 2009: 310). A significant approach to this problem in the historiography of scientific popularization, as Topham observes, can be found in Secord’s argument in “Knowledge in Transit” (Secord, 2004) about the diverse paths through which knowledge circulates and is created: “Questions of ‘how knowledge travels, to whom it is available, and how agreement is achieved’ are fundamental to the making of knowledge, and in this sense the process of knowledge making *involves* communication, rather than merely being followed by it” (Topham, 2009: 311). This shift in the historiography of science dovetails with the emphases of literature and science on what James Bono has characterized as “analytic attention to the performative effects and affordances of literary and linguistic dimensions of science” and on “the networks of exchange that foster the circulation of the objects, material practices, and epistemic things that contribute to the making of scientific knowledge” (Bono, 2010: 556-557).

Keeping in mind such emphases in both fields on processes of knowledge making, I would argue that we must attend not only to scientific journals and self-consciously popularizing journals but also to a wider range of periodicals, including newspapers, reviews, and even science

fiction pulp magazines and occult periodicals. Tropes and analogies for scientific concepts of the period circulated freely through these as well. Moreover, we must discover whether practicing research scientists took up tropes arising from other cultural and knowledge domains, and must seek to chart how meanings shifted in the process.

Domaining as a concept for literature and science and for periodical studies

To interpret the shifting meanings and implications of scientific concepts as they circulate through and percolate up from many areas of modern print culture, we might, as noted above, adopt a term placed into the conceptual toolkit of scholarship in literature, science, and technology: the concept of ‘domaining’. In Strathern’s 1992 volume *Reproducing the Future: Anthropology, Kinship, and the New Reproductive Technologies*, she explains that “in cultural life, in those habits of thought about which for most of the time we are very much unaware, the ideas that reproduce themselves in our communications *never reproduce themselves exactly*. They are always found in environments or contexts that have their own properties or characteristics. These environments or contexts provide a range of domains . . . [and], insofar as each is a domain, each imposes its own logic of ‘natural’ association. Natural association *means* that ideas are always enunciated in an environment of other ideas, in contexts already occupied by other thoughts and images. Finding a place for new thoughts becomes an act of displacement” (Strathern, 1992: 6). Squier’s work focuses on the domaining effect that is a feature of the construction of scientific knowledge about reproduction in the modernist period and beyond:

Reproductive ideas circulate through the overlapping realms of literature, popular culture, and science via the operations of analogy. . . . [A]n understanding of the domaining effect, as it functioned in that circulation of ideas in Britain in the 1920s and 1930s, can illuminate our present understanding of reproductive technology. (Squier, 1994: 27)

This understanding of analogy in domaining is attentive to disciplinary boundaries but fully aware of the creative effect of their frequent transgression, and it helps underscore the ways in which contemporary scholarship on literature, science, and technology traces across the twentieth century the role of literature in the development of contemporary scientific conceptions—whether of reproductive technologies or of nuclear weapons.

Periodicals are themselves an environment conducive to the creative joinings and displacements that happen when ideas are elaborated across domains, as they combine multiple authors, different genres, and visual images (often provided by multiple illustrators who are themselves different from the writers whose texts they illustrate), or in the context of advertising text and images. Domaining often happens across and among different types of periodicals, but sometimes these domaining effects take place *within* a single periodical. Let me illustrate the role of periodicals in domaining using a few brief examples, one from biology and medicine derived from Squier's own work, and one from atomic theory in my own.

In *Babies in Bottles*, Squier (1994) uses scientific texts, popular science writing, and literary works to explore the far-reaching social consequences of nascent reproductive technologies imagined and developed in the 1920s—including endocrine treatment, experimental embryology, artificial parthenogenesis, and tissue culture—in relation to later twentieth-century understandings of reproductive technologies (Squier, 1994: 39-42). Squier charts the circulation and construction of key ideas, tropes, and images in reproductive science through periodicals, including scientific journals, popularizing periodicals, newspapers, and even pulp science fiction magazines, all of which became the terrain of freely circulating analogies whose social meanings shifted across domains. For example, Squier interprets the circulation of tropes and images in Julian Huxley's career and across the twentieth-century development of IVF, beginning with the four-year-old Huxley reading Charles Kingsley's Darwinian moral fairy tale of human embryology and human development, *The Water-Babies* (published serially in *Macmillan's Magazine* in 1862-1863 and in book form in 1863). The young Huxley marveled at an illustration featuring two prominent biologists—T. H. Huxley (Julian's grandfather) and Richard Owen—looking at a 'water baby' in a bottle of water. Squier traces images and tropes from this

early reading through Huxley's 1919 experiment feeding minced thyroid to his own water baby, a Mexican amphibian called an axolotl. In his experiment, the axolotl, which naturally lives permanently as a tadpole or eft, artificially and astonishingly matured into a large salamander-like creature adapted to the air. Huxley published his experiment in *Nature* and was quickly greeted by sensationalized newspaper headlines in the mass-circulation *Daily Mail*: "Young Huxley has discovered the Elixir of Life"; "A Great Discovery. Thyroid Gland Marvels. Control of Sex and Growth. Renewal of Youth" (Squier, 1994: 36). Huxley received so many letters that he wrote an article to clear up misconceptions and thus launched his career as a popular science writer. Squier explains:

The axolotl experiment . . . illustrates the domaining effect: the subtle shift that takes place in ideas when they move from one cultural or social context to another. As the ideas moved from Kingsley's fairy story to Huxley's adult scientific work, they continued to reflect Kingsley's interest in development and differentiation. But—and here's the domaining effect—reflecting the new instrumental preoccupation of the scientific realm, Huxley did more than observe development and differentiation. He tried to reconstruct it. Moreover, as he transferred those principles . . . from fiction to fact, what got lost was Kingsley's warning against meddling in nature's secrets. A fictional affirmation that there are limits to human knowledge became a scientific assertion that there should be no such limits. (Squier, 1994: 38)

Moving this scientific knowledge into new discursive domains and connecting it to the popular cultural circulation of alchemical tropes, Huxley then published a popular science essay provocatively titled "Searching for the Elixir of Life" in *The Century Illustrated Monthly Magazine*,² referring to Alexis Carrel's tissue-culture experiments at The Rockefeller Institute, and speculating about human tissue culture. Highlighting the work of analogy in science, Squier explains that "the tissues cultured by Carrel were not human, but avian. But when Huxley addressed the implications of tissue culture, he characteristically worked by analogy, shifting to consider the implications of the tissue-culture process for the human being. He also shifted the context for considering tissue

² Julian Huxley, "Searching for the Elixir of Life", *The Century Illustrated Monthly Magazine*, vol. 103, no. 4, February 1922, p. 621-629.

culture from science to fiction in the course of his essay, mirroring a process of discursive drift common in the culture at large” (Squier, 1994: 42). That movement into fiction leads Squier to the science fiction pulp magazines of the 1920s. In the August 1927 issue of Gernsback’s quintessential science fiction pulp *Amazing Stories*, Julian Huxley published “The Tissue-Culture King”,³ a fictionalization of the issues his *Century* essay addressed. Francis Flagg’s “The Machine Man of Ardathia”,⁴ published in the November 1927 issue of *Amazing Stories*, “not only anticipates the machinery for embryo culture as part of in vitro fertilization but is an uncanny anticipation of our dominant current representation of the product of IVF—the test-tube baby—in the sketch of a dome-headed, naked creature enclosed in a transparent oblong glass tube” (Squier, 1994: 45-46). Ultimately, the concepts and images Squier traces through Julian Huxley’s work, their science fiction elaborations, and Aldous Huxley’s babies in bottles in *Brave New World* (1932) found their scientific and medical elaboration in the late 1970s in in-vitro fertilization (IVF), the ‘test tube baby’ covered in *Time* magazine⁵ and elsewhere, which had by then lost all of the conflicting and contested terrain of earlier concerns about the ethical and social implications of such scientific and medical manipulation of reproduction.

Another simple illustration of such a dynamic comes from the realm of nuclear physics. John Canaday’s thoughtful book *The Nuclear Muse* highlights the birth of the atomic age in the modernist period. Canaday captures the connections among Manhattan Project physicist Leo Szilard’s work on the atomic bomb, H. G. Wells’s modernist-era novel *The World Set Free* (published in 1914, but read by Manhattan Project physicists as they worked on the bomb), and Soddy’s 1909 volume *The Interpretation of Radium*, which inspired Wells’s novel: “the first nuclear weapons were in an important sense . . . a scientific

³ Julian Huxley, “The Tissue-Culture King”, *Amazing Stories*, vol. 2, no. 5, August 1927, p. 451-459.

⁴ Francis Flagg, “The Machine Man of Ardathia”, *Amazing Stories*, vol. 2, no. 8, November 1927; p. 798-804.

⁵ *Time*’s “Test-Tube Baby” issue was published on July 31, 1978. They revisited the subject in the July 25, 2018 issue featuring the now 40-year old Louise Brown, the first person to have been born using IVF.

interpretation of a fictional interpretation of a scientific interpretation of radioactive substances” (Canaday, 2000: 228).

But beginning long before 1914, and leading up to the technological realities of nuclear warfare summarized by Canaday, is a long arc of domaining effects that can be witnessed in the alchemical tropes by which radioactivity was figured well into the 1930s across periodicals from several genres. If I might try to condense into a few paragraphs what took me an entire monograph⁶ to at least partially unpack, let me begin with an oft-quoted account by Nobel Prize-winning chemist Frederick Soddy of his paradigm-shifting discovery, with physicist Ernest Rutherford, that radioactive thorium was transforming into an inert gas. Soddy recalled, “I remember quite well standing there transfixed as though stunned by the colossal import of the thing and blurring out—or so it seemed at the time: ‘Rutherford, this is transmutation: the thorium is disintegrating and transmuting itself into an argon gas.’ The words seemed to flash through me as if from some outside source. Rutherford shouted to me in his breezy manner, ‘For Mike’s sake, Soddy, don’t call it *transmutation*. They’ll have our heads off as alchemists. You know what they are.’” Soddy added, “I was, of course, tremendously elated to have discovered transmutation—the goal of every chemist of every age”, adding that his thoughts were “always occupied with transmutation. That is natural; I was a chemist. I only want to show how our brains were working, mine on transmutation and gases, Rutherford’s on thorium and alpha ray emissions” (qtd. in Howorth, 1958: 82, 84). This was, essentially, a boundary dispute between the nascent field of radiochemistry and the field that would eventually be named nuclear physics. Physicists, as Soddy portrays Rutherford, investigate energies and radioactive emanations, while chemists are concerned with the nature of the elements.

Physicists eventually won this boundary dispute, taking possession of radioactivity in university research, and it bothered Soddy that Rutherford won the Nobel Prize in *Chemistry* for this research. But the way Soddy understood in alchemical terms what was happening at the atomic level as a transmutation of one element into another—thorium into what he soon identified as helium—clearly illustrates Strathern’s understanding that “awareness takes shape against

⁶ The account that follows is in part derived from Morrisson (2007).

previous experiences, earlier positions, interests formulated for other purposes, and other contexts. Thus (new) ideas are thought through other (old) ideas. . . . Habitual images and familiar metaphors provide the cultural forms that make ideas communicable" (Strathern, 1992: 4-5). The radioactive decay of thorium had been happening for billions of years on Earth, yet only in 1896 had Henri Becquerel 'discovered' the radioactivity that had been happening around human beings for our entire existence as a species. To understand how that radioactivity was produced took another form of seeing, one that involved concepts and tropes of alchemy for Soddy to understand it.

The meaning of alchemical transmutation in this scientific domain, how its meanings shifted within this domain, and how it in turn produced knowledge whose meanings also changed across other domains is very much the kind of dynamic that Strathern's work highlights when she argues, in the passage I quote above, that "each [domain] imposes its own logic of 'natural' association. Natural association *means* that ideas are always enunciated in an environment of other ideas, in contexts already occupied by other thoughts and images. Finding a place for new thoughts becomes an act of displacement" (Strathern, 1992: 6). Or, as she has succinctly put it: "The anthropological analysis of culture points to the general human facility for making ideas out of other ideas. We make fresh concepts by borrowing from one domain of life the imagery by which to structure other areas" (Strathern, 1992: 15).

Soddy's bold and dubious claim that chemists of every age saw transmutation as their goal was, in fact, a product of displacements across multiple domains already. In England, France, and Germany, histories of chemistry (going back to Hermann Kopp's *Geschichte der Chemie* [1843-1847] and, later, Ernst von Meyer's volume of the same title [first published in 1889]), and the research of French chemist Marcellin Berthelot (1885) on original alchemical texts, led to popular histories of chemistry in England, such as those of Sir William Ramsay's boyhood friend, M. M. Pattison Muir. Alchemical history influenced chemistry pedagogy, while a generation of chemists, including Soddy, were students. But the evolution of thinking about alchemy as the pre-history of chemistry and the role alchemical tropes played in helping Soddy challenge Daltonian chemistry's understanding of atoms derived, in part, from newly available alchemical texts published during an occult revival of interest

in alchemy in the late nineteenth and early twentieth centuries. The source material that worked its way into chemistry classrooms had, at times, even come directly from texts made available and popular by the occult alchemical revival.

Yet the meanings of transmutation, already shifting across histories of chemistry and into modern radiochemistry, were quite different from those of that occult alchemical revival. In the domain of chemistry education, alchemy was not being taught as a spiritual practice for young students to try out, as it was understood in occult hermetic texts, but rather as an example of the early history of chemistry and an opportunity to ponder the nature of matter. On the other hand, numerous occult periodicals, such as *The Occult Review* and *Lucifer*, frequently began to engage with the new science of radioactivity to find confirmation of occult beliefs and to garner some of the cognitive authority of science to buttress the legitimacy of those beliefs. The occult alchemical revival insisted that material transmutation entailed spiritual transmutation of the self and the soul and had a kind of moral and religious imperative. This notion was lost when alchemical transmutation was taken up by academic chemistry and physics.

The notion of transmutation traveled yet further afield, into the domains of monetary theory and economics, as the confirmation of the transmutability of elements was taken up in discussions of the gold standard and the nature of value. It is, in this context, prescient that Wells's novel of nuclear warfare *The World Set Free* imagined the collapse of Western economies as gold lost any possibility of intrinsic value. In the domain of monetary theory in works by Arthur Kitson⁷ or science fiction works such as Wells's or others, transmutation had neither a spiritual nor a scientific meaning. Rather, the idea of transmutation displaced classical monetary theory's sense of the intrinsic value of an element as the bedrock of all financial transactions. While Kitson and others had been railing against the gold standard in monetary writings since the 1890s, the fact that radioactive decay was described in tropes of alchemical transmutation changed the nature of these monetary arguments in ways that

⁷ See: Kitson, 1895, 1903, 1917.

Wells registers in his novel. Transmutation's new cross-domain travel through nuclear physics into monetary theory, in turn, created institutions such as the Economic Freedom League, which brought Soddy and Kitson together, and it played out in popular science and economic writings in mass-circulation periodicals, which ran headlines such as those in *The New York Times* in 1924: "SYNTHETIC GOLD MIGHT DISRUPT WORLD' / Commercial Use Would Mean Chaos in Finance / Without Regulation, Economist Says" (Bent, 1924), contributing to an environment in which Western governments could eventually choose to take their economies off the gold standard during the Great Depression.

In the monetary realm, the displacement caused by the movement of ideas about the mutability of matter (e.g., in alchemical transmutation) made room for the 'moral idea of money'. As Nicholas Mayhew describes this concept, a gold-backed currency represented "a constant and unchanging currency with which to measure personal or public obligations" (Mayhew, 2000: xi). Demonstrating the apparently inevitable nature of ideas rooted in a domain, Mayhew notes that "when the [British] National government of 1931 did eventually devalue and abandon gold, its Labour Cabinet predecessors complained that no one had told them you could do that" (Mayhew, 2000: 214-215). During the financial chaos leading up to the Depression, then, stories such as David M. Speaker's "The Disintegrating Ray",⁸ published in 1928 in *Amazing Stories* (that is, in the same Gernsback pulps that had explored the new physics in terms of transmutation), engaged and helped define the economic and monetary anxieties emerging from a science that could destabilize the nature of matter. In this domain in the 1930s, 'modern alchemy' took on political and moral meanings about wealth and ownership.

What I have been describing is the domainning effect of alchemical tropes across and among periodicals of numerous genres from many different domains across time. But this effect can also be seen playing out within the pages of individual periodicals, such as the *Journal of the Alchemical Society*. Formed in late 1912 in London by a University of

⁸ David M. Speaker, "The Disintegrating Ray", *Amazing Stories*, February 1928, p. 1088-1091.

London trained chemist, Fellow of the Chemical Society, and alchemy enthusiast H. Stanley Redgrove, the Alchemical Society boasted as its honorary president John Ferguson, Regius Professor of Chemistry at the University of Glasgow from 1874 to 1915 (including the years in which Soddy taught as the first lecturer in physical chemistry and radioactivity in the department) and a key bibliographer of alchemical texts. Though it collapsed during the height of the War in 1916, the Alchemical Society created a borderland in which scientists, engineers, and historians could come together monthly, along with assorted occultists and mystics, to discuss and write about several dimensions of alchemy. The Society published the *Journal of the Alchemical Society* (1913-1915), not with an occult publisher but with popular science publisher H. K. Lewis, who also ran a Technical and Scientific Circulating Library. The *Journal of the Alchemical Society* itself and the activities of the Society were reviewed regularly in occult publications, such as *The Occult Review*, but also in mainstream papers such as *The Westminster Gazette*; intellectual publications such as *The Athenaeum*; popular scientific periodicals such as *The English Mechanic* and *Knowledge*; and even in scientific journals such as *Nature* and *The Chemical News*.

What occurred in the pages of the *Journal of the Alchemical Society* around tropes, concepts, and images from alchemy exemplifies Strathern's insistence upon the cultural nature of all cross-domain transformations and the knowledge each of them produces: "Now if culture consists in established ways of bringing ideas from different domains together, then new combinations—deliberate or not—will not just extend the meanings of the domains so juxtaposed; one may expect a ricochet effect, that shifts of emphasis, dissolutions, and anticipations will bounce off one area of life into another. And while culture is a world of the imagination, it is not a fantasy one whose power lies in the impossibility of realization. On the contrary, it has its constraints and its effect on how people act, react, and conceptualize what is going on around them: it is the way people imagine things really are" (Strathern, 1992: 3).

Within the pages of the *Journal of the Alchemical Society* could be found at least five conflicting interpretations of alchemy. The chemist founder of the society, Redgrove, argued that the alchemists were among

the foremost scientists of their period but argued deductively, rather than inductively, applying tenets of mystical theology to their laboratory work. Yet he argued that alchemical thought was relevant to contemporary science, because “recent developments in physical and chemical science seem to indicate that the alchemists were not so utterly wrong in their concept of nature, as has formerly been supposed—that, whilst they certainly erred in both their methods and their interpretations of individual phenomena, they did intuitively grasp certain fundamental facts concerning the universe” (Redgrove, 1913: 2). Some occultists in the pages of the journal argued that alchemical symbolism and language protected a secret code from profane minds and that it was a chemical science with spiritual dimensions; others held that such a secret was one of spiritual self-transmutation. A practicing psychoanalyst in the group saw alchemy as a process of psychological self-transformation, while a few argued that the medieval and Early Modern alchemists had indeed achieved the transmutation of metals, the elixir of life, and other medical feats, whether using chemical processes or mental and spiritual powers.

Conclusion

The ricochet Strathern highlights can be seen in the *Journal of the Alchemical Society* as the idea that alchemical concepts used across multiple domains did, indeed, create new meanings. Psychoanalysis could now be seen not so much as a curative response to illness but as a form of self-transformation; the physics of radioactivity could be seen as part of a chemical tradition whose insight was into the transformations of matter rather than the nature of energies—more or less in the line of thinking that alchemy had helped Soddy understand in his experiments with Rutherford; modern science could be seen as a key indicator of spiritual attainment. In short, the cognitive authority of science could be used through alchemy to buttress esoteric and occult understandings of the world, while the new science of radioactivity could be understood as allowing humans to transform the material world, as Soddy (1912) would argue in a popular science article titled “Transmutation: The Vital Problem of the Future”, in which he reversed the common view of alchemy’s giving way to modern chemistry, instead envisioning modern

chemistry giving way to modern alchemy. And such material knowledge could, as we have seen, call into question the moral nature of finance and economics by undermining the gold standard. This is the nature of the domaining effect: alchemy didn't mean or entail exactly the same thing across each of these domains, but it did produce new possibilities for what could be thought and imagined in each of them.

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